UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Modern Energy Sources

2627-2-F7603Q011-F7603Q01101

Aims

The course provides students with fundamental knowledge of renewable energy technologies, focusing on solar, wind, hydroelectric, geothermal. Students will learn about the most recent advancements in these technologies and their potential future developments. The course also explores energy scenarios to achieve carbon neutrality by 2050. Students will understand the operating principles of these technologies and gain hands-on experience, particularly in photovoltaic energy. Practical activities will enhance their learning through real-world applications, fostering problem-solving skills.
Key learning objectives include:
• Understanding the fundamental principles of renewable energy technologies.
• Analyzing the environmental and economic impact of renewable energy sources.
• Exploring emerging trends and innovations in renewable energy

Contents

• Renewable energy sources: solar, wind, hydroelectric, geothermal
• Environmental and techno-economic analysis of renewable energy technologies.
• Advantages and disadvantages of different technologies.
• Role of renewable energy in achieving EU's 2050 carbon neutrality target.
• Case studies and practical applications with a special focus on photovoltaics

Detailed program

• Overview of greenhouse gas emissions and their impact.
• Transition from fossil fuels to renewable energy.

• Principles and applications of solar energy (photovoltaic and thermal).
• Wind energy: technology, potential, and limitations.
• Hydroelectric power generation: large-scale and small-scale applications.
• Geothermal energy: principles and applications.
• Practical sessions on photovoltaic system design and analysis.

Prerequisites

• Basic knowledge of physics and chemistry.
• Basic understanding of energy concepts.

Teaching form

14 two-hour in-person lectures (32 hours total), including guest lectures by renewable energy experts, including professionals from the industry, to provide real-world insights and case studies and discussions
6 two-hour online lectures (16 hours).
4 hours of hands-on practical activities, with a focus on photovoltaic technology.

Textbook and teaching resource

• Lecture slides and notes.
• Additional reading materials, including scientific articles and reports, available on the e-learning platform.

Semester

• I semester (October - January)

Assessment method

The final examination will take the form of an oral interview. There will be a single oral interview for both modules of the course. The Exam is structured as the follow an oral interview about the topics of the lessons and of a class presentation. The students must do at the end of the course a class presentation of about 15 minutes on a subject selected from a list of topics that the teachers will give at about at the middle of the semester . This presentation will count for 30% of the final grade
• Assessment criteria:

1. Knowledge and understanding.
2. Ability to connect different concepts.
3. Critical thinking and analytical skills.
4. Proper use of scientific terminology.

Students with Specific Learning Disorders should refer to the Student Guide and the DSA Service at the University (https://en.unimib.it/services/offices-and-facilities/disability-sld-binclusion-space

Office hours

• Available every weekday (Monday to Friday) by appointment via email.

Sustainable Development Goals

AFFORDABLE AND CLEAN ENERGY | RESPONSIBLE CONSUMPTION AND PRODUCTION | CLIMATE ACTION